

SIEMENS

Ingenuity for life

Industrial machinery and heavy equipment

Festo

Leading plant and process automation firm uses Mechatronics Concept Designer to develop flexible packaging machines for the cosmetics industry

Product

NX

Business challenges

Enable manufacturers to fill and pack different products and formats in a single production line

Keys to success

Provide customers with confidence their application will work in the beginning stages of the quotation phase

Determine if customer requirements can be met in terms of cycle speed, output, etc.,

Results

Developed flexible packaging machines for the cosmetics industry

Enabled engineers from different disciplines to work simultaneously on projects, reducing development time by up to 30 percent

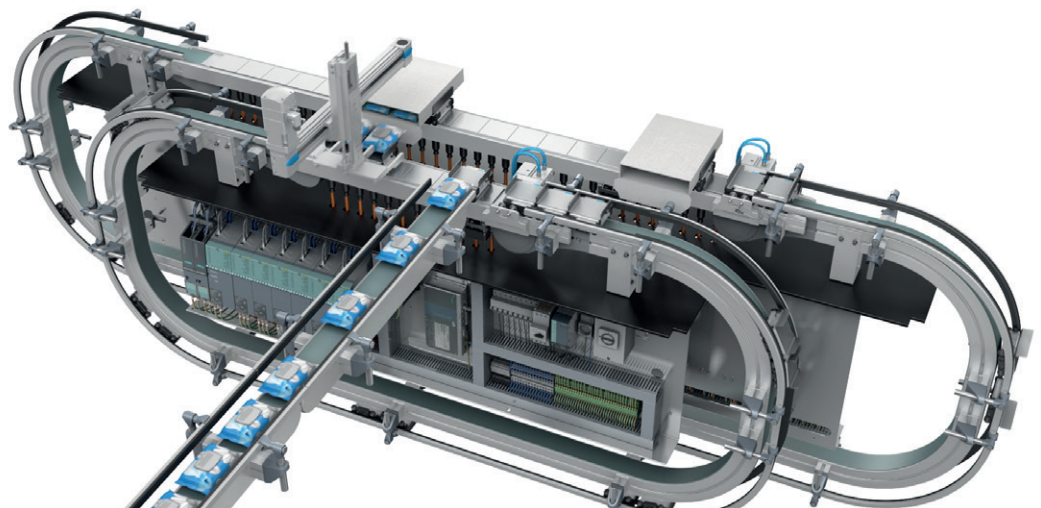
Designed the transport solution more efficiently by re-using data

Siemens Digital Industries Software solution enables Festo to reduce development time by up to 30 percent

Delivering flexible transport solutions

When cosmetics manufacturer Dr. Kurt Wolff wants to fill up his Alpecin bottles by an extra 20 percent as a small holiday bonus for his customers, he no longer needs to stop the production line for retooling. Thanks to the Multi-Carrier-System (MCS®) developed jointly by Festo and Siemens Digital Industries Software, it is now possible at the touch of a button. Festo is able to design such flexible transport solutions according to customer requirements in mere minutes using the Mechatronics Concept Designer™ software module.

Developed by Siemens Digital Industries Software and based on its NX™ software computer-aided design (CAD) system, Mechatronics Concept Designer is a solution for designing and simulating kinematic and physical motion sequences, and virtual commissioning of machines and equipment, including motors, actuators and sensors. It is an interdisciplinary application for systems engineering: mechanical, electrical and software engineers, and automation experts can use it to develop and validate their machine concepts, and quickly explore alternative concepts in a shared system environment based on customer requirements throughout a project. Engineers from these disciplines can work simultaneously on projects using Mechatronics Concept Designer, which reduces development time by up to 30 percent.



“Mechatronics Concept Designer lets us show motion sequences of individual carriers or carrier groups in a way that is easy to understand.”

Stefan Blaschke
Project Manager,
Multi-Carrier-System
Festo

Using Mechatronics Concept Designer enables quick design and validation of mechatronics concepts and details while making use of product models from the CAD system. The software combines 3D modeling with the simulation of concepts with multibody physics and accurate automation. Instead of building expensive prototypes, machines and systems can be simulated using real control software and operated virtually.

The software enables Festo to create a digital twin machine or system and virtually commission it. The machine model is also connected to the real machine control to test the functionality of the entire application. These features enable the mechatronics engineers to greatly speed up the commissioning of the real machine.

Mechatronics Concept Designer enhances the typical design functionality of NX by giving it a realistic simulation environment in which physical forces and movable objects can be displayed and simulated. Mechatronics Concept Designer utilizes the Bullet physics engine, an open-source software for the simulation of physical properties of rigid and non-elastic bodies. Motion sequences are defined using a virtual cam profile, which can be visualized and optimized in a Gantt chart.

“We take the components from NX and breathe life into them,” says Stefan Blaschke, project manager of the Multi-Carrier-System, who assists in the implementation of transport solutions for Festo and their customers across the globe. With Mechatronics Concept Designer, the motion of the individual carriers can be simulated throughout the entire production process.

Joint development by Festo and Siemens
MCS® was jointly developed by Festo and Siemens with the aim of providing maximally flexible packaging machines for the cosmetics industry. A key customer requirement in this industry is to be able to fill and pack different products and formats on a single production line. Using MCS enables manufacturers to achieve this level of flexibility through small linear motor-driven carriers that transport the containers to the individual stations for filling, labeling or packing.

The transport system is used in the production process only when flexibility and intelligence are required. The MCS sections in the production line, including the return paths of the carriers, are connected by a cost-effective, conventional transport system.

“Mechatronics Concept Designer offers huge time savings in the design of machines and systems.”

Stefan Blaschke
Project Manager, Multi-Carrier-System
Festo

With the advent of Industry 4.0 and the digital plant, the flexible transport solution is also relevant for other fields and applications such as assembly lines. That is why Festo and Siemens have begun to offer MCS to a wider customer base. It enables firms to design a transport solution more efficiently without continuously reinventing the wheel.

“There were two essential objectives for the use of Mechatronics Concept Designer,” says Blaschke. “On one hand, we wanted a way to be able to test if we were able to meet customer requirements in terms of cycle speed, output, etc., and to show the results to the customer. Mechatronics Concept Designer lets us show motion sequences of individual carriers or carrier groups in a way that is easy to understand. On the other hand, we needed a reliable simulation tool to be able to accurately design the Multi-Carrier-System that also correctly accounted for the physical forces involved.”

Library of prepared kinematic CAD models

Mechatronics Concept Designer lets you import components and assemblies from NX or other CAD systems and give them physical and kinematic properties and define constraints. The models can then be saved in a library and re-used together with their given properties. For example, Festo reproduced all essential components of MCS in Mechatronics Concept Designer, which has significantly accelerated the design of new systems.

MCS® enables maximum production flexibility by freely and synchronously transporting the parts of production to the individual stations in the production line. Festo develops the mechatronics components of the MCS such as linear motors, carriers, sensors, connections and assembly components, while Siemens Digital Industries Software provides the electronics and software for the control and operation of the transport solution. The flexible transport system is jointly

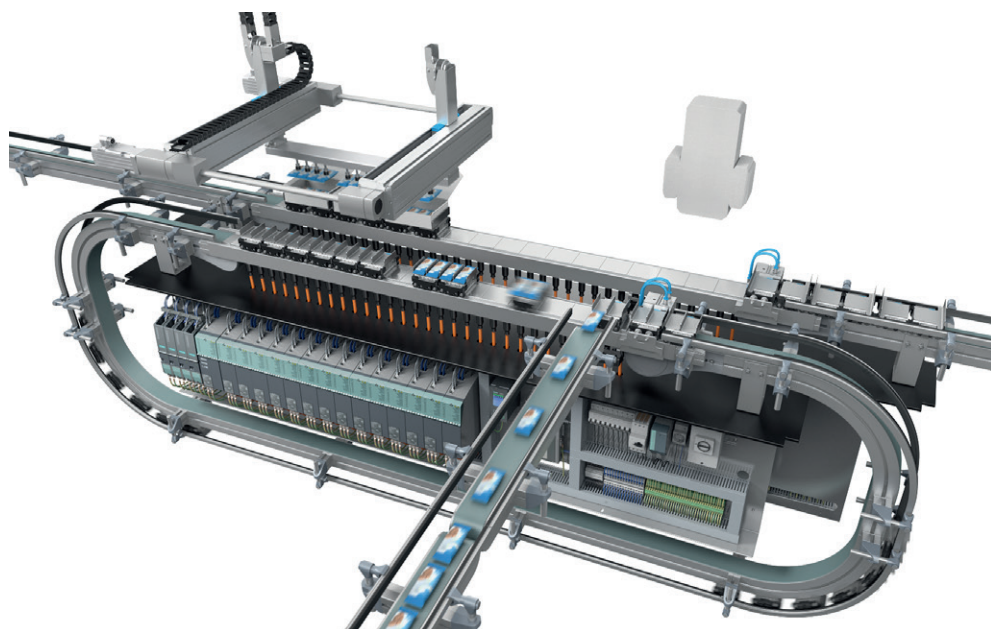
marketed by Festo and Siemens. It can be freely configured, easily integrated into existing intralogistics and modularly combined with existing transport solutions.

“Once we have entered the customer requirements, we can generate the first results in a matter of minutes, which then of course still need to be optimized,” explains Blaschke. “Because we have added the kinematic properties to the NX models, the time it takes to design has been drastically reduced.”

The customer parameters (cycle times, acceleration, etc.) are transferred to a Mechatronics Concept Designer template via a custom application interface. The parameters capture the necessary framework for the design transport solution in terms of their physical properties. You can think of it as a generic kinematic model, which has dynamic properties that are controlled by the given parameters. How the system’s configuration looks is defined by the project engineers in accordance with the customer’s application, layout of the production line, etc.

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Solutions/Services

Mechatronics Concept Designer
siemens.com/nx

Customer's primary business

Festo is a family-owned company based in Esslingen, Germany, and is a global leader in plant and process automation. It provides automated solutions for electrical and pneumatic systems to over 300,000 customers worldwide. With 18,700 employees and €2.64 billion annually in revenue, the company's mission is to maximize customer productivity and competitiveness.
www.festo.com/group/en/cms/index.htm

Customer location

Esslingen
Germany

Video animation provides added value for the customer

The behavior of the customer-specific transport solutions is simulated in 3D according to the given parameters, which can be recorded as a video animation and shown to the customer.

"This is unique in the market. It gives our customers the assurance that their application will already work in the beginning stages of the quotation phase," says Blaschke.

But Mechatronics Concept Designer doesn't offer only animated images; the simulation data can be exported instantaneously to check, for example, the load of individual motor segments.

"Mechatronics Concept Designer offers huge time savings in the design of machines and systems," emphasizes Blaschke.

However, the user must first invest some time to be able to exploit this savings potential. Blanche explains that although individual components can be prepared relatively quickly, to model a complete system with all its physical properties for storage in a library requires more preparation time.

In the future, it will be even easier for users of the Siemens Digital Industries Software simulation applications to design drive components from Festo. In cooperation with CADENAS 3D parts catalogs, the company is planning to offer its customers prepared kinematic linear motors and other components for download. That is one more reason to choose Festo components, as the buyer can test components to see if they perform the required functions in their application before placing the order.

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